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RECENT TRENDS IN JAPANESE IMPORTS: A STUDY BY THE BANK OF JAPAN*

Summary

U.S. trade officials, frustrated by the seemingly non-stop expansion of the trade deficit with Japan, are once again pressing Tokyo to take steps to increase imports of American-made products, particularly manufactured goods. In the following article, Bank of Japan economists analyze the sluggish behavior of Japanese imports during the early 1980s and examine why purchases began to rebound strongly after mid-1983. They point out that while structural changes in the Japanese economy dampened demand for raw materials and fuels, imports of manufactures outpaced the growth of the economy. This expansion, however, was not big enough to rein in Japan's trade surplus. For imports to increase significantly, argue the authors, the yen must rise in value. A stronger yen would be particularly effective in stimulating demand for foreign-made manufactures, it is noted.

Introduction

Japan's industrial structure underwent major changes after the second oil crisis of the 1970s. This transformation had two beneficial effects on

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imports: imports of raw materials and fuels fell due to a decline in the share of the materials industry in GNP and the decreased input volume per unit of output in that industry; and imports of intermediate goods declined, held down by the decreased input volume per unit of output in the processing industry. On the other hand, the rising share of the processing industry in GNP and stepped-up substitution of imports for domestically manufactured intermediate goods contributed to an increase in imports. On the whole, however, the changes in the industrial structure led to a reduction in the volume of Japan's imports.

The volume of final goods and foodstuffs imported varied in line with changes in relative prices but continued to increase steadily and at a faster pace than the Japanese economy. This was the result of increased demand for imported goods, which reflected a rise in the standard of living and the consequent diversification of consumer tastes, and the gradual easing of restrictive measures on imports of foodstuffs.

The volume of imports began to increase sharply after mid-1983 as Japan's economy moved into the recovery stage. The relative prices of imported goods also became more attractive due to the rise in the value of the yen after the end of 1982. Moreover, there was a lull in the structural transformation that had contributed to the low level of imports until mid-1983.

Despite the increase in imports, Japan has continued to record an enormous trade surplus because exports have expanded more rapidly than imports. It is necessary for Japan to increase imports steadily in order to improve its external imbalance and to ward off international trade frictions. For this purpose, Japan must make further efforts to expand domestic demand and open up the domestic market and, at the same time, stabilize the yen's value at a higher level. In the short run, the effect of a rise in the value of the yen on imports is not large. However, there is likely to be an increase in imports of intermediate goods and final goods, both of which have expanded their shares of total imports in recent years. Furthermore, from a somewhat longer-term viewpoint, the appreciation of the yen will help encourage the substitution of imported goods for domestically produced ones. Considering the effects of a rise in the value of the yen on both imports and exports, stabilizing the yen's value at a higher level will help achieve external equilibrium.

Trends and Changes in Imports

Trends in Imports - There was a bulge in imports (measured in dollar terms on a c.i.f. basis) during both of the oil crises of the 1970s owing to an upsurge in import prices. Excluding these two unusual periods, imports generally continued to increase at a stable pace. After the second oil crisis, however, imports reversed course and showed a significant slowdown in growth in 1981. In both 1982 and 1983, they dropped sharply, registering falls of 7.9 percent and 4.2 percent, respectively, at annual rates.

Trends in the value of imports after the second oil crisis may be divided into two factors: price and volume (see Figure 1). Import prices started to decline as a result of the worldwide relaxation of supply and demand

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conditions for commodities. They also dropped in 1983, mainly because of falling oil prices. The decline in the value of imports in 1982 and 1983 owed much to the fall of import prices. In addition, import volume continued to contract during the three years after the second oil crisis (1980 to 1982) as Japan's economic growth remained low by historical standards. (The average growth of real GNP was 3.8 percent during this time.) Hence, the decrease in import volume seems to have reflected both temporary and cyclical factors. This, however, was the first time since World War II that the volume of imports declined for three years in a row despite positive rates of real economic growth. It is likely that changes in the structure of the Japanese economy during this period restrained imports. (The elasticity of import volume with respect to real GNP changed from plus 1.44 in the 1976-79 period to minus 0.41 in the 1980-83 period.)

Accordingly, the sluggishness of imports in value terms between 1981 and mid-1983 seems to have resulted from three interrelated factors: falling import prices induced by the worldwide recession, the stagnation of the domestic economy, and a structural shift that brought import economization in its wake.

Changes in the Structure of Imports - How then has Japan's import structure changed? Figure 2 illustrates the composition of imports by type of goods. In terms of value, no large changes occurred except for fuels, which expanded their share. Throughout most of the period from 1970 to 1983, raw materials and fuels accounted for about 60 percent of imports. Manufactured goods and foodstuffs commanded nearly 30 percent and 10 percent, respectively.

A review of imports by volume reveals that the share of raw materials and fuels contracted substantially -- from 53.1 percent in 1970 to 37.9 percent in 1983, while manufactured goods expanded greatly in the same period -- from 33.3 percent to 45.6 percent. These figures show that Japan's import structure is shifting toward imports of manufactured goods and away from imports of raw materials and fuels.

These changes are related to substantial changes in Japan's industrial structure and consumption patterns as well as to the progress of industrialization in developing countries. In the following sections this paper examines the influence of changes in Japan's industrial structure on the composition and volume of imports, particularly raw materials and fuels and intermediate goods.

Import Trends and Industrial Structure

Raw Materials and Fuels - The volume of imported raw materials and fuels showed a sizable decline in 1974 immediately after the first oil price hike, but from 1975 to 1979 it moved up with some fluctuations. Following the second oil price hike, however, volume decreased almost continuously after peaking in mid-1979 and did not change direction until recently (see Figure 3). During this period the real growth rate continued to be positive. As a result, the elasticity of the import volume of raw materials and fuels with respect to real GNP continued to be negative from 1980 to 1983 (minus 0.99) after declining to plus 0.26 in the 1975-79 period from 1.42 in the 1971-74 period.

The volume of basic materials used by the materials industry followed a pattern very similar to that of the import volume of raw materials and fuels. This is attributable to the fact that most imported raw materials and fuels are consumed first by the materials industry, which includes steel, nonferrous metals, chemicals, paper and pulp and textiles. Afterward, products manufactured by that industry are used as intermediate goods by other industries or are consumed directly.

Changes in consumption by the materials industry (and hence movements in the import volume of raw materials and fuels) may be divided into two categories: the level of production in the materials industry and the trend in inputs of basic materials per unit of output in that industry. Therefore, changes in the elasticity of the volume of imported raw materials and fuels with respect to real GNP can be explained by two factors: (1) the deviation between the output level of the materials industry and real GNP (changes in the share of the materials industry), and (2) changes in the input volume of raw materials per unit of output in the materials industry (see Figure 4).

Production in the materials industry increased rapidly until the first oil price hike, owing to the abundant volume and low prices of raw materials and fuels and the robustness of fixed investment, which in turn reflected vigorous demand for manufactured goods. Average annual output in the materials industry rose 11.2 percent between 1966 and 1973, higher than the annual 9.8 percent growth rate of real GNP during the same period. This shows that the growth of the materials industry was a driving force in the country's rapid economic expansion.

After the first oil crisis, the share of the materials industry in real GNP declined temporarily. This resulted from weak demand for basic materials as the sharp rise in raw material and fuel costs led to an upsurge in prices. After the economy entered the recovery phase, industrial production outpaced real GNP and the materials industry recovered at a somewhat more rapid pace. (Industrial production grew at a 5.8 percent average annual rate between January-March 1975 and October-December 1979, while real GNP during the same period rose 5.3 percent per year.)

After the second oil price hike, however, production in the materials industry continued to drop for a long period, falling by an average annual rate of -3.5 percent from the first quarter of 1980 to the last quarter of 1982, while real GNP grew at a 3.8 percent average yearly rate. The factors behind the persistent fall were: (1) a reduction in inputs per unit of output and the shift from domestically produced goods to imported materials in the processing industry in response to the rise in materials prices and (2) greater expenditures on services at the expense of goods.

Inputs per unit of output in the materials industry climbed at a 1.3 percent annual growth rate from 1965 until 1973, but after the first oil crisis, declined at an average annual rate of 1.8 percent from January-March 1975 to October-December 1979 -- as manufacturers tried to reduce energy consumption and streamline management in response to surging raw material and fuel prices. After the second oil crisis, the decline in the input-output ratio accelerated, falling at an average annual rate of 2.7 percent from

January-March 1980 to October-December 1982 (see Appendix Note 1), due in part to increased capital expenditures.[1]

Thus, although the real growth rate of the economy remained positive, these two factors -- the decreased share of the materials industry and the reduction in the amount of raw materials and fuels used by that industry to make a unit of output -- caused the volume of imported raw materials and fuels to decline. Figure 4 illustrates the estimated impact of these two factors. During the five years following the first oil crisis, there was a slight increase in the share of the materials industry in real GNP, and this raised the import volume of raw materials and fuels by a small 0.4 percent per year. However, a decline in the input volume per unit of output during this period lowered the import volume of raw materials and fuels at a 1.8 percent annual rate. During the three years following the second oil crisis, the share of the materials industry and the input volume per unit of output both declined, which contributed to a sizable fall in the import volume of raw materials and fuels -- by 7.3 percent and 2.7 percent, respectively, per year. Thus, the movements during the above two periods showed a very contrasting pattern.

After the beginning of 1983, however, a rise in the share of the materials industry led to an increase in import volume. At the same time, the downward effect on imports resulting from the reduction in the volume of raw materials and fuels consumed per unit of output lessened significantly.

Imports of Intermediate Goods - Figure 5 shows trends in the import volume of intermediate goods, used mainly by the processing industry (machinery and metal products). Import volume continued to recover steadily after falling sharply between mid-1974 and early 1975 in reaction to the economic downturn and big speculative purchases during the first oil crisis. Real imports showed a small drop immediately after the second oil crisis but advanced steeply in 1981. Moreover, in contrast to raw materials and fuels, the elasticity of the import volume of intermediate goods with respect to real GNP growth also rose sharply, climbing to 1.33 in 1981, 2.73 in 1982 and 3.30 in 1983.

The output of the processing industry fluctuated almost in tandem with the volume of intermediate goods consumed until 1979. From 1980 through 1982, however, an unusual phenomenon too place: production increased but consumption of intermediate goods fell. On the other hand, starting from about the middle of 1981, the volume of imported intermediate goods increased at a faster rate than production and consumption of intermediate goods in the processing industry. These movements suggest that both the reduction in the input-output ratio and the substitution of imported goods for domestically produced goods occurred simultaneously.

Figure 6 examines this point in greater detail. It divides the volume of imported intermediate goods into three factors: changes in the share of the processing industry in GNP, changes in the volume of intermediate goods consumed per unit of output, and the substitution of imports for domestic goods. During the five years after the first oil crisis, the rise in the processing industry's share of GNP raised the import volume by 5.9 percent annually, but brought little change in the input volume per unit of output. In the three years following the second oil crisis, the growth rate of industrial production was smaller than that of real GNP -- due mainly to increased

expenditures on services -- and the ratio of processing to GNP grew more slowly. Consequently, its pull on the import volume of intermediate goods lessened substantially, dropping to just 0.5 percent a year. More importantly, the processing industry's input volume per unit of output decreased sharply during this period, lowering the quantity of imported intermediate goods by 6.3 percent annually. This decline was attributable not only to rationalization in the processing industry but also to the spread of more efficient production processes.

The substitution of imports for domestically produced intermediate goods has raised import volumes by 4 to 8 percent annually in recent years, and it is this process that accounts for the divergent behavior of the import volume of intermediate goods and the volume of basic materials consumed by the processing industry from 1981 on. Substitution was fueled by a spectacular decline in the international competitiveness of Japan's materials industry (for example, aluminum and petrochemicals) because of the run-up in the prices of raw materials and fuels in the 1970s, and accelerated imports of lower-priced products like steel and cotton yarn from newly industrialized countries (see Appendix Note 2).

In this connection, as Table 1 shows, the price elasticity of the import volume of intermediate goods was 1.25, a rather high level compared with that of other goods. Figure 7 shows that, when relative prices of imported goods are more favorable, the share of imported goods expands after a certain period of time. In recent years, however, the relationship between relative prices and the share of imported goods has become weaker. The share of imports rose from 1981 on despite the fact that relative prices were less favorable than in 1978 -- a reflection of the fact that imported goods, including aluminum ingots, naphtha and some steel products, which had been considered marginal sources of supply, are now treated as stable supply sources.

Industrial Structure and Imports - To sum up, the substantial changes in Japan's industrial structure after the second oil crisis have transformed its import structure by reducing the share of raw materials and fuels and increasing the share of intermediate goods. Overall, these changes have reduced Japan's import volume through five channels: (1) the decreased share of the materials industry, (2) the reduced input volume per unit of output in the materials industry, (3) the reduced input volume per unit of output in the processing industry, (4) the increased share of the processing industry, and (5) the substitution of imports for domestically produced intermediate goods in the processing industry.

Needless to say, these five factors are inter-related. Table 2 estimates the effects of these factors on the import volumes of raw materials and fuels and intermediate goods, and shows an annual decline of 3.9 percent during the 1980-82 period. During this time, the shrinking materials industry pulled the overall import volume down by 5.4 percent annually and dips in the input volume per unit of output in both the materials industry and the processing industry accounted for drops of 2 percent and 1.6 percent a year, respectively. On the other hand, the impact of the increased share of processing on the import volume was only a gain of 0.1 percent annually. The use of foreign intermediate goods in place of domestic products raised these imports 4 percent annually from 1980 to 1982, but at the same time reduced

imports of raw materials and fuels. Accordingly, the overall effect of the shift to imported intermediate goods was only a 0.6 percent annual boost to the import volume.

Imports of Final Goods and Foodstuffs

Final Goods - The import volume of final goods (manufactured goods excluding intermediate goods) continued to increase more rapidly than the Japanese economy as a whole during the 1970s and early 1980s (see Figure 8). The volume ratio of imports of final goods to total imports rose sharply -- from 17.4 percent in 1970 to 29 percent in 1983. At the same time, though, there were frequent and substantial short-run changes in the volume of imported final goods. These changes seem to have a close relationship with the movement of relative prices, except around 1979, when imports of manufactures responded with a lag to the rapid appreciation of the yen between 1977 and 1978.

The relationship between changes in the relative prices of final goods, which include both consumer items and capital goods, and the share of imports in the domestic market is shown in Figure 9. Changes in the share of imported consumer goods followed those of relative prices with a short lag, suggesting a comparatively close relationship between the two. Unlike intermediate goods, however, the changes in relative prices were slight, and the share of imported consumer goods remained almost unchanged in the neighborhood of 6 percent. The share of imported capital goods similarly fluctuated in line with the movements of relative prices. However, relative prices became considerably less favorable for imported goods after the second oil crisis, declining 35.1 percent between 1980 and 1983, and this contributed to a decline in the share of imports. The significantly reduced profitability of imported goods in terms of relative prices occurred (only in capital goods, not in other products. This was the result of the further strengthening of the price competitiveness of Japan's machinery industry after the second oil crisis, which was largely due to the rationalization of production and efforts to develop new products.

Foodstuffs - The volume of imported food climbed at a faster pace than real household expenditures on food and beverages during the eleven years through 1983 (see Figure 10), reflecting increased demand and the gradual easing of import restrictions. Significantly, the growth in the value of imports that were liberalized during the 1969-71 period substantially exceeded the expansion in the total import value of all food, although growth rates differed from commodity to commodity (see Appendix Note 4).

The short-term variations in import volume also reflected changes in relative prices. The sluggish pace of imports during the 1974-75 period and the sharp increase from 1977 to 1970 paralleled changes in the profitability of imports during these periods. As Figure 10 shows, the increase in the volume of imports in recent years coincided with the greater price competitiveness of foreign commodities. Therefore, if restrictions on imports of foodstuffs are further eased, relative price movements are expected to exert an even greater influence on the import volume than before.

Recent Import Trends and Outlook

After a long period of sluggishness, the volume of imports recovered strongly in the latter part of 1983 (see Figure 11). The extent to which this

rebound will be succeeded by a sustained expansion is examined here by analyzing the relationship between imports and the business cycle, relative prices and structural changes in Japan's economy.

Business Recovery - The economy fell into recession from the autumn of 1981 to early 1983 because of a decline in exports, but recovered in the spring of that year, led by a sharp surge in exports. The export expansion continued in the following months and from around the middle of 1983 stimulated a moderate recovery in final domestic demand. In the process, industrial production increased at a faster pace than real GNP after lagging overall growth in both 1981 and 1982. (Industrial production increased by 8.5 percent from 1982's final quarter to the fourth quarter of 1983, compared with a 3.5 percent gain for real GNP. This accelerated inventory adjustment of raw materials and fuels, and since mid-1983 has induced imports to expand faster than real GNP.

The rapid growth of production was a result of two factors: the business recovery was led by exports, which have a strong ripple effect on output; and the recovery of consumption was closely related to the production of goods, as evidenced by the accelerated increase in spending for consumer durables in 1983 and the sluggish growth of expenditures for services.[2] At any rate, the large increase in industrial production was a significant factor in boosting imports throughout 1983.

Relative Prices - Relative prices of domestic and foreign goods are determined by the difference in inflation rates between Japan and other countries as well as by changes in the yen's value against the dollar. In the short run, though, the effect of fluctuations in the exchange rate is the major factor. The yen was weak from early 1981 to around the end of 1982, mainly because of the increased gap between American and Japanese interest rates and the stronger preference for dollar assets, but it then strengthened and generally moved within a narrow range during 1983.

In terms of the performance of prices and Japan's international balance of payments, the yen was too weak in 1983, but it did appreciate by 4.9 percent from 1982's average level. Because of the difference in inflation rates between Japan and other countries, import prices, even excluding crude oil prices, became more favorable relative to domestic prices in 1983, declining by 1.5 percent versus a 0.7 percent drop in domestic wholesale prices. As a result, the relative prices of imported goods (excluding crude oil) improved by nearly 6 percent. Imports of finished goods with a high demand elasticity increased at a faster pace than the recovery of domestic demand, which probably contributed to the sharp growth of imports after mid-1983.

Halt in Decline of Input-Output Ratio - As described earlier, the accelerated reduction in the input-output ratio resulting from investments for energy conservation and rationalization after the second oil shock was a significant factor behind the decrease in the import volume from 1980 to 1982. The round of large-scale plant and equipment investment for this purpose came to an end in 1982, and the 1983 decline in crude oil prices somewhat reduced the incentive to save energy. As a result, the rate of decrease in the input-output ratio slowed considerably. In the materials industry, the ratio declined at an annual rate of 0.3 percent between 1983's first quarter and last

quarter, compared with a fall of 2.7 percent from January-March 1980 to October-December 1982; in the processing industry, the corresponding drops were 1.4 percent and 6.3 percent. Accordingly, Japanese business conditions were changing in such a way in 1983 that an increase in production would contribute to an expansion in imports.

Current Outlook for Imports - The increase in the volume of imports since mid-1983 can be attributed to a number of factors, including cyclical movements reflecting the business recovery and increasingly favorable relative imports prices in response to the appreciation of the yen. In addition, the decline in the input-output ratio -- the structural factor -- came to a halt.

Several factors point to the possibility that the volume of imports will continue to increase. First, the present business recovery, though initially export-led, will probably become more stable because of the recovery of final domestic demand. Second, the growth of imports is more likely to be related to increased production and consumption of raw materials and fuels and to inventory levels than it was during the recovery cycle after October 1977 (see Figure 12). And last, although there are many uncertainties about the yen's value, dollar-denominated import prices are not expected to rise substantially for some time; therefore, relative import prices are expected to remain favorable for Japan.

Japan's trade surplus in 1983 ended up at $31.5 billion, much higher than the previous peak of $24.6 billion in 1978. As noted, while the volume of imports increased sharply, the export volume rose at an even faster pace. Moreover, import prices fell by 5.4 percent in 1983, while export prices declined only 2.7 percent.

To avoid trade disputes, an important problem at present, Japan should take steps to reduce its large trade surplus by pursuing a steady expansion of imports. Because import prices are largely determined by conditions over which Japan has little direct influence, the country must basically reduce the margin of its trade surplus in volume terms. It is therefore necessary to determine whether the growth of imports in volume terms will exceed that of exports.

To examine why the volume growth of exports and imports diverge, import inducement coefficients by final demand category were estimated (see Table 3). The coefficients of both domestic demand and exports have fallen in recent years, but the decline in the import inducement coefficient of exports was especially large. This decline reflects the fact that the materials and processing industries succeeded in reducing the input-output ratio through rationalization and a shift in production to high value-added products; and that in the process, the share of the processing industry (whose import inducement coefficient originally was lower than that of the materials industry) in Japan's total exports increased. Therefore, when a business recovery is led by exports, as is currently the case, the divergence in the volume growth of exports and imports necessarily becomes greater than it was before. This is despite the fact that the import inducement coefficient of exports is larger than that of domestic demand.[3]

To correct the disequilibrium in the growth of export and import volumes, further efforts must be made to expand imports. For this purpose, it

is necessary for domestic demand to remain on a recovery path. However, since the import inducement coefficient of domestic demand is relatively small, even if domestic demand expands at a faster pace in the future, the effect on imports will necessarily remain extremely small compared to the absolute value of the trade surplus. We estimate, for example, that an increase of 1 percent in real final demand causes the volume of imports to grow by about 0.8 percent (about $1 billion based on 1983 prices).

To expand imports, it is necessary for relative prices to move in a favorable direction. The ony way to realize this while maintaining the stability of domestic prices is to strengthen the value of the yen.

As the structure of Japan's imports in volume terms reveals a high proportion of raw materials and fuels that cannot be replaced by domestic commodities, the price elasticity of imports as a whole is not very high. On the other hand, the price elasticity of processed goods such as intermediate goods and final goods is relatively high. Moreover, the price elasticity of imported manufactures (final products and intermediate goods) has gradually risen in recent years (see Figure 13). Accordingly, the appreciation of the yen can have a significant impact on imports of manufactured products.

A breakdown of imports by products and regions (see Figure 14) shows that the share of manufactured goods imported by Japan from Europe and the United States far exceeded the average for total imports. Therefore, a stronger yen is expected to accelerate imports of finished goods not only from newly industrialized countries but also from Europe and the United States, where trade frictions are a serious problem. In addition, a rise in the yen's value will naturally put a brake on the expansion of exports, which would also help to correct the disequilibrium. Thus, stabilizing the value of the yen at a higher level while making efforts to open the domestic market should be the right course for Japan to expand the volume of imports and alleviate trade frictions.

Footnotes

[1]See "Recent Trends in Private Plant and Equipment Investment," Bank of Japan Special Paper No. 113, 1984.

[2]

Changes in Real Household Expenditures

	1982		1983	
	Jan.-June	July-Dec.	Jan.-June	July-Dec.
Goods	2.6%	1.0%	-0.1%	1.3%
Durables	2.4	0.3	4.3	15.4
Services	2.9	5.7	1.2	0.1

[3]See "Structural Adjustment Problems of the Japanese Economy After the Second Oil Shock," Bank of Japan Special Paper No. 108, and "Recent Trends in Private Plant and Equipment Investment," Bank of Japan Special Paper No. 113.

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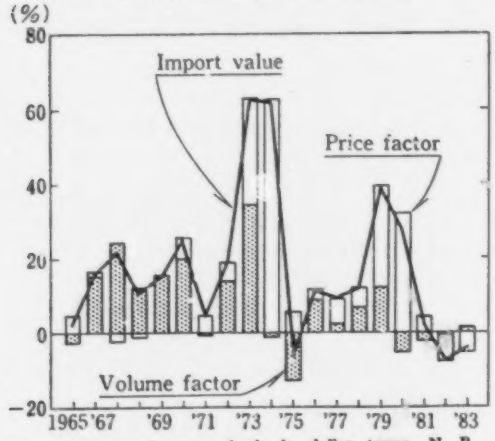
Figure 1 Trends in Import Value and Other Data (year-on-year comparison)



Note: Customs clearance basis in dollar terms. N. B. Dollar-denominated import prices were estimated by the Research and Statistics Dept., Bank of Japan.

Source: Summary Report on Trade of Japan (Japan Customs Association).

Figure 2 Percentage Composition of Imports by Goods Category

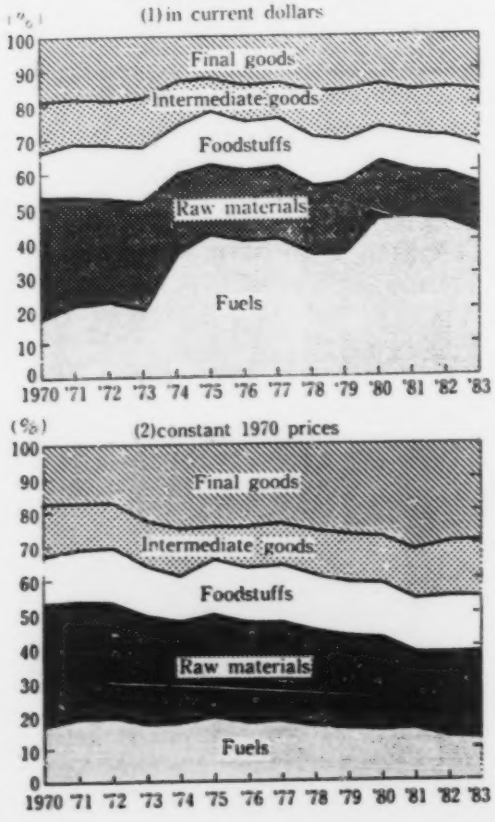
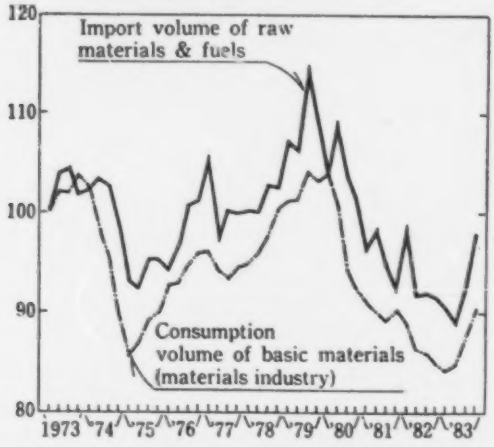


Figure 3 Trends in Import Volume of Raw Materials and Fuels (seasonally adjusted, 1973 I =100)



Notes:

1. Import volume of raw materials and fuels (mineral fuels excluding oil products) has been averaged by using 1980 import value as weights. Oil products have been placed under the category of intermediate goods.
2. Materials industry: iron and steel, nonferrous metals, ceramics, stone and clay products, petroleum, coal, chemicals (excl. medicines), paper and pulp, and textiles.

Sources:

Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI).

Notes:

1. Real shares were calculated by the following formula:

$$\text{1970 import value weights} \times \frac{\text{Import volume in given year}}{\text{Import volume in 1970}}$$

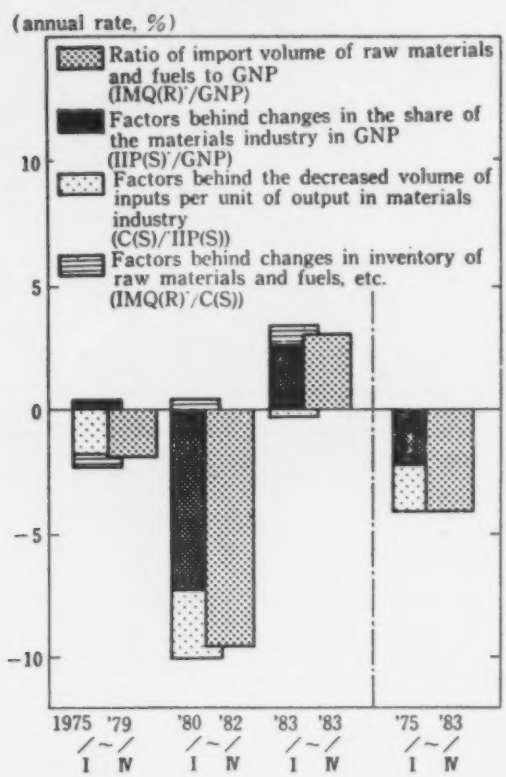
N. B. Import volume of fuels, intermediate goods and final goods was estimated by the Research and Statistics Dept., Bank of Japan.

2. Fuels: mineral fuels (excl. petroleum products).
   Intermediate goods: iron and steel, nonferrous metals, chemical products, textiles and petroleum products.
   Final goods: manufactured goods excluding intermediate goods.

Source:

Summary Report on Trade of Japan (Japan Customs Association).

Figure 4 Factor Analysis of the Ratio of Import Volume of Raw Materials and Fuels to GNP (seasonally adjusted)


(annual rate, %)
Ratio of import volume of raw materials and fuels to GNP (IMQ(R)'/GNP)
Factors behind changes in the share of the materials industry in GNP (IIP(S)'/GNP)
Factors behind the decreased volume of inputs per unit of output in materials industry (C(S)/'IIP(S))
Factors behind changes in inventory of raw materials and fuels, etc. (IMQ(R)'/C(S))
10
5
0
−5
−10
1975 '79 I ~ IV
'80 '82 I ~ IV
'83 '83 I ~ IV
'75 '83 I ~ IV

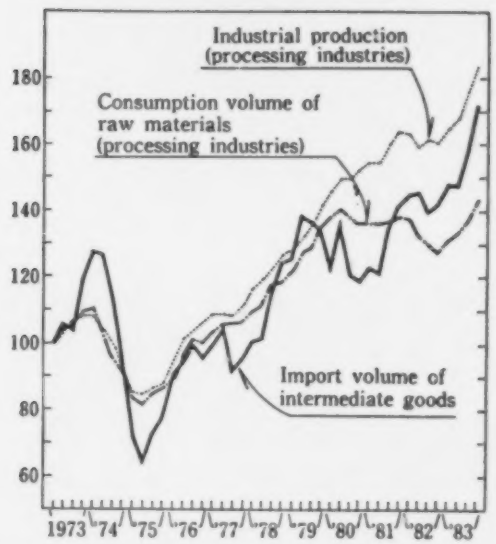
Notes:

1. The following identity equation was used to analyze the factors:
   $IMQ(R) = GNP \cdot (IIP(S)/GNP) \cdot (C(S)/IIP(S)) \cdot (IMQ(R)/C(S))$
   Accordingly, $(IMQ(R)'/GNP) = (IIP(S)'/GNP + (C(S)'/IIP(S)) + (IMQ(R)'/C(S))$
   (where, IMQ(R): import volume of raw materials and fuels.
   GNP: real GNP.
   IIP(S): materials industry production.
   C(S): consumption of basic materials by the materials industry.)
2. See Notes of Figure 3 for the description of import volume of raw materials and fuels and the materials industry.

Sources:

Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI), Annual Report on National Accounts (EPA).

Figure 5 Trends in Import Volume of Intermediate Goods (seasonally adjusted, 1973 I = 100)



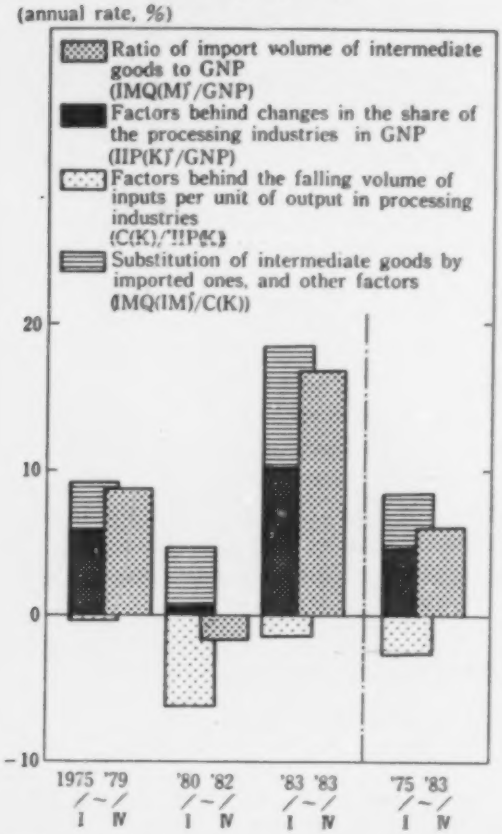
Notes:

1. Import volume of intermediate goods: Import volume of oil products, chemical products, iron and steel, nonferrous metals and textiles has been averaged by using 1980 import value weights.
2. Processing industries: Machinery manufacturing, metal products manufacturing.

Sources:

Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI).

Figure 6 Factor Analysis of the Ratio of Import Volume of Intermediate Goods to GNP (seasonally adjusted)


(annual rate, %)
Ratio of import volume of intermediate goods to GNP (IMQ(IM)/GNP)
Factors behind changes in the share of the processing industries in GNP (IIP(K)/GNP)
Factors behind the falling volume of inputs per unit of output in processing industries (C(K)/IIP(K))
Substitution of intermediate goods by imported ones, and other factors (IMQ(IM)/C(K))
20
10
0
−10
1975 '79 I/~/IV
'80 '82 I/~/IV
'83 '83 I/~/IV
'75 '83 I/~/IV

Notes:
1. The following identity equation was used to analyze the factors:
IMQ(IM) = GNP · (IIP(K)/GNP) · (C(K)/IIP(K)) · (IMQ(IM)/C(K))
Accordingly, (IMQ(IM)/GNP) = (IIP(K)/GNP) + (C(K)/IIP(K)) + (IMQ(IM)/C(K))
(where, IMQ(IM): import volume of intermediate goods
GNP: real GNP
IIP(K): production by processing industries
C(K): consumption of raw materials by processing industries)
2. See Notes of Figure 5 for the description of import volume of intermediate goods and the processing industries.

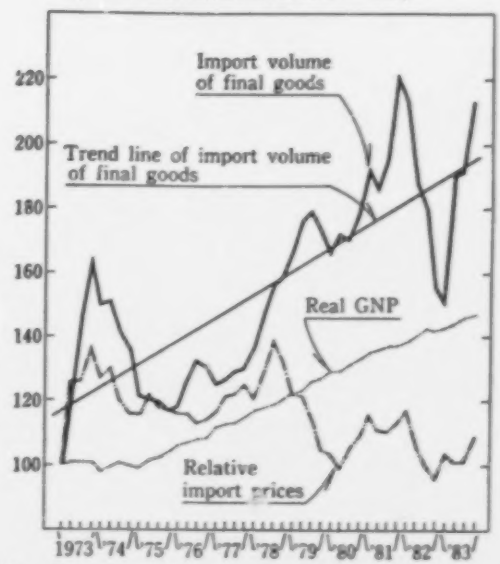
Sources:
Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI), Annual Report on National Accounts (EPA).

Figure 7 Share of Imported Intermediate Goods and Relative Import Prices

Notes:
1. The share is in real terms using 1980 prices.
2. Relative import prices = Domestic wholesale prices (intermediate goods) / Yen-denominated import prices (intermediate goods)

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Wholesale Price Indexes (Bank of Japan), Census of Manufacturers (MITI).

Figure 8 Trends in Import Volume of Final Goods (seasonally adjusted, 1973 I = 100)

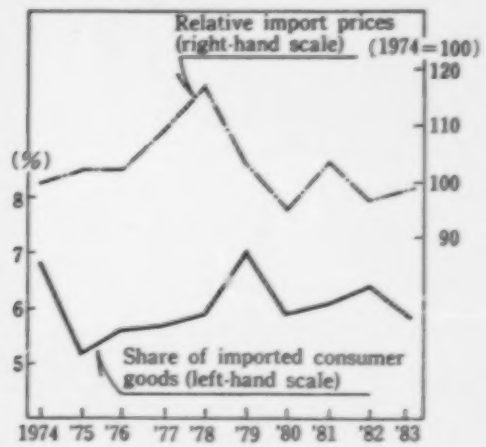


Notes:
1. Import volume of final goods: Import volume of manufactured goods minus import volume of iron and steel, nonferrous metals, textiles and chemical products (weights are based on 1980 import value).
2. Relative import prices = Domestic wholesale prices (final goods) / Yen-denominated import prices (final goods)

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Wholesale Price Indexes (Bank of Japan), Annual Report on National Accounts (EPA).

Figure 9 Share of Imported Final Goods

(1) Share of imported consumer goods and relative import prices

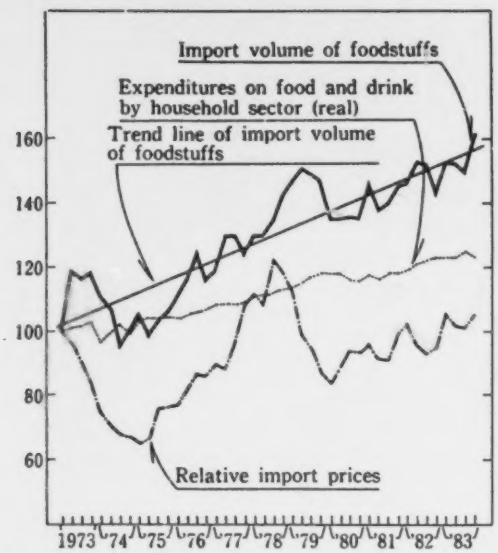


(2) Share of imported capital goods and relative import prices

Notes:
1. The share is in real terms using 1980 prices.
2. Relative import prices =
$$\frac{\text{Domestic wholesale prices (consumer goods, capital goods)}}{\text{Yen-denominated import prices (consumer goods, capital goods)}}$$

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Wholesale Price Indexes (Bank of Japan), Census of Manufacturers (MITI).

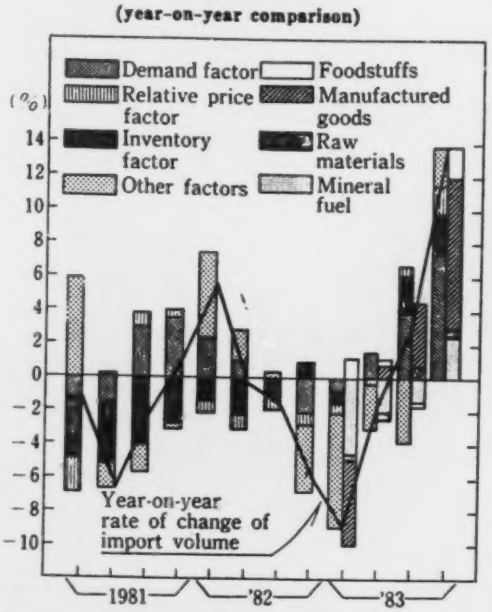
Figure 10 Trends in Import Volume of Foodstuffs (seasonally adjusted, 1973 I = 100)



Notes:
1. Relative import prices =
$$\frac{\text{Domestic wholesale prices (foodstuffs)}}{\text{Yen-denominated import prices (foodstuffs)}}$$
2. Real household sector expenditures on food and drink from the April-June quarter of 1983 have been estimated by the Research and Statistics Dept., Bank of Japan.

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Wholesale Price Indexes (Bank of Japan), Annual Report on National Accounts (EPA).

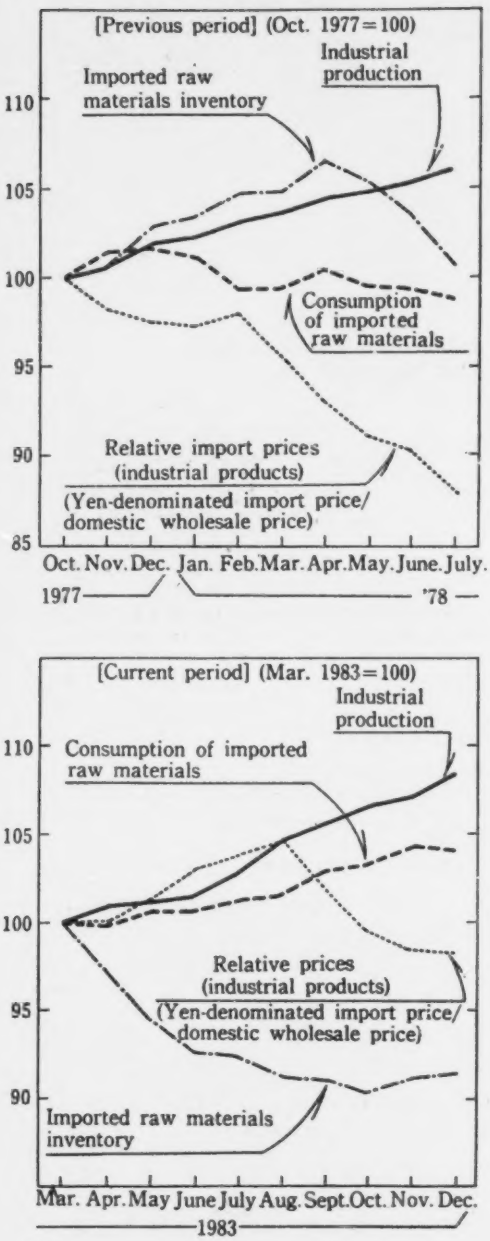
Figure 11 Factor Analysis of Changes in Import Volume (year-on-year comparison)



Note:
The import volume function in Appendix Note 3 was used in the factor analysis of demand and other factors.

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI), Wholesale Price Indexes (Bank of Japan).

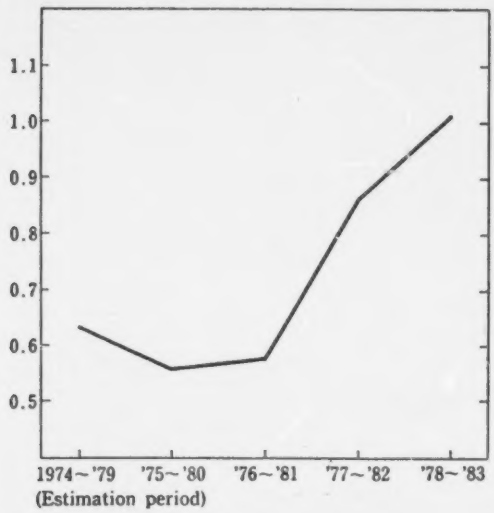
Figure 12 Comparison of Import Recovery Phases



Notes:
1. Seasonally adjusted, 3-month moving average.
2. Indexes in both periods were calculated by import volume in the month with the lowest volume of imports = 100.

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI), Wholesale Price Indexes (Bank of Japan).

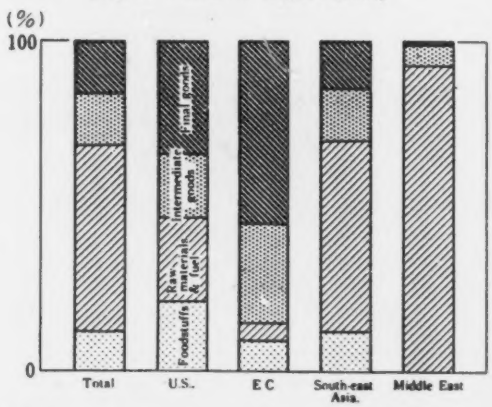
Figure 13 Price Elasticity of Imported Goods



Note:
This type of function is referred to in Appendix Note 3.

Sources:
Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI), Wholesale Price Indexes (Bank of Japan).

Figure 14 Percentage Composition of Import Value, by Region (1983)



Sources:
Summary Report on Trade of Japan, Monthly Report on Trade of Japan (Japan Customs Association).

Table 1 **Price Elasticity of Import Volume, by Type of Goods**

Import volume (total)	Raw materials & fuels	Manufactured goods	Intermediate goods
0.27	0.00	1.08	1.25

Note: See Appendix Note 3 for the description of the equation.
Sources: Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (Ministry of International Trade and Industry, hereafter MITI), Wholesale Price Indexes (Bank of Japan).

Table 2 **Effect of Changes in Industrial Structure on Changes in Import Volume (Raw Materials and Fuels + Intermediate Goods) (1980-82)**

(annual rate, %)

Total import volume (raw materials and fuels + intermediate goods)	Changes in industry share		Decreased inputs per unit of output			Influence of substitution of domestic intermediate goods by imported goods	Influence of reduced imports of raw materials & fuels due to substitution of domestic intermediate goods by import goods	Others (demand factor, etc.)
	Decreased share of materials industry	Increased share of processing industry		Materials industry	Processing industry			
△ 3.9	△ 5.3	△ 5.4	+ 0.1	△ 3.6	△ 2.0	△ 1.6	+ 1.0 (+ 4.0)	(△ 0.4 (△ 0.6))	+ 4.0

Notes: 1. See Notes to Figure 3 for the description of the materials industry and its import volume of raw materials and fuels, and see Notes to Figure 5 for the description of the processing industry and its import volume of intermediate goods.
2. The identity equations in Figures 4 and 6 were used for the contribution rate analysis. The influence of reduced imports of raw materials and fuels owing to the substitution of domestic intermediate goods by imported goods has been calculated by the following formula:

$$IMQ(R) = IIP^{*} \cdot \left(\frac{IIP(S)^{*}}{IIP^{*}}\right) \cdot \left(\frac{IIP(S)}{IIP(S)^{*}}\right) \cdot \left(\frac{C(S)}{IIP(S)}\right) \cdot \left(\frac{IMQ(R)}{C(S)}\right)$$

$IMQ(R)$: Import volume of raw materials and fuels.
IIP^{*} : Industrial production (if no substitution by imported intermediate goods had occurred).
$IIP(S)^{*}$: Industrial production (materials industry) (if no substitution by imported intermediate goods had occurred).
$IIP(S)$: Industrial production (materials industry).
$C(S)$: Consumption of raw materials (materials industry).

3. Figures in parentheses denote contribution rates of raw materials and fuels and intermediate goods to the respective changes in import volume.

Sources: Summary Report on Trade of Japan (Japan Customs Association), Industrial Statistics Monthly (MITI), Annual Report on National Accounts (Economic Planning Agency, hereafter EPA).

Table 3 **Import Inducement Coefficients, by Final Demand Category**

(1) Changes in import inducement coefficients, by final demand category

(%)

	1970	'75	'80	'82
Total final demand	11.78	10.30	10.28	9.91
Exports	15.67	14.67	11.66	10.79
Domestic demand	11.39	9.73	10.07	9.54

(2) Import inducement coefficients of exports by materials and processing industries and their shares in total export value

(%)

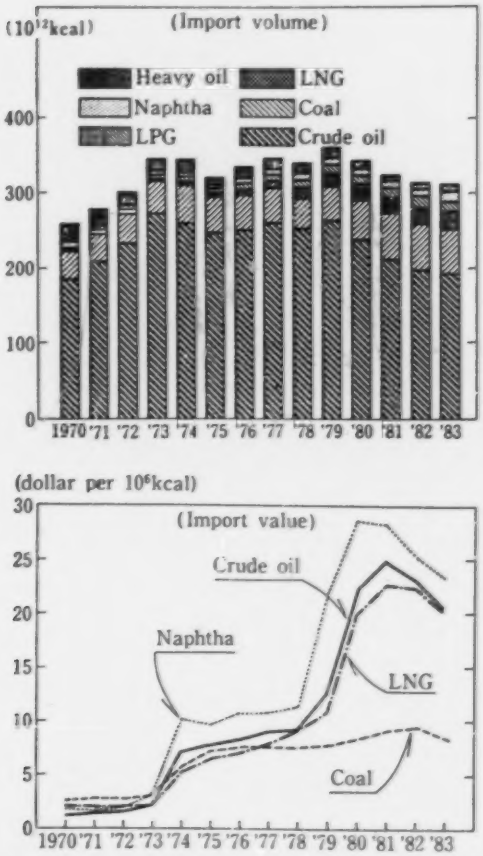
	1970	'75	'80	'82
Inducement coefficients				
Materials industries	24.9	24.7	20.5	20.1
Processing industries	12.0	10.0	8.7	8.2
Share in total exports				
Materials industries	33.3	30.9	24.7	21.7
Processing industries	41.0	46.9	56.8	60.0

Note: Items in both (1) and (2) are estimated using 1975 prices.
Sources: Input and Output Tables for Linking 1970, and 1975 (Administrative Management Agency), The 1980 Input and Output Table (extension tables) (MITI), Nikkei Input and Output Tables for 1982 (Nihonkeizai Shimbun-sha).

〔Appendix Note 1〕

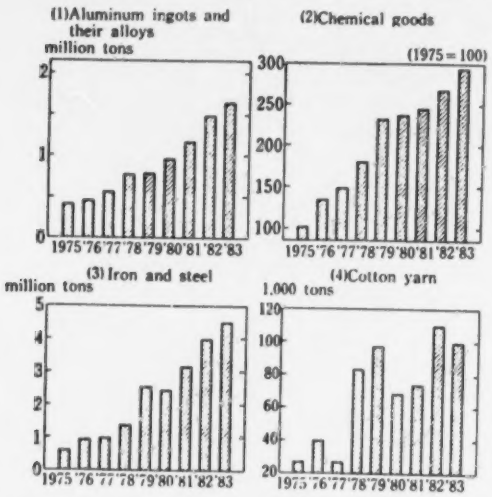
Plant and equipment investment in response to the large increase in raw materials and fuel prices aimed not only at reducing inputs per unit output, but also, in a number of cases, switching of fuels as a result of changes in the relative prices of fuels (e.g. the shift of energy source from oil to coal in the iron-steel and cement industries). The proportion of crude oil imports to total imports has decreased greatly in recent years due to its high price per calorie, while imports of relatively low-priced coal and LNG have risen.

Import Volume and Import Value of Fuels (in terms of kcal)



Sources:
Summary Report on Trade of Japan (Japan Customs Association), Energy Statistics (Agency of National Resources and Energy).

〔Note 2〕 **Import Volume of Major Intermediate Products**



Source: Summary Report on Trade of Japan (Japan Customs Association).

〔Note 3〕 **Import Volume Functions, by Item (Estimation period 1978/I-'83/IV, t value in parentheses)**

(Total volume of imports)

$$l_n\text{〔Total volume of imports〕} = \sum_{i=-1}^{0} a_i \, l_n\text{〔Industrial production〕} - \underset{(-2.76)}{0.23} \, l_n\text{〔Inventory ratio of imported raw materials}-1\text{〕}$$

$$+ \sum_{i=-3}^{0} b_i \, l_n\text{〔Yen-denominated import price (total)/domestic wholesale price (overall average)〕}$$

$$+ \underset{(4.31)}{2.51}$$

a_i		b_i		
$i=0$	0.48(6.50)	$i=0$	−0.05(−1.90)	$R^2=0.82$
-1	0.48(6.50)	-1	−0.07(−2.69)	
	0.95(6.50)	-2	−0.08(−4.30)	D.W.=1.69
		-3	−0.07(−1.33)	
			−0.27(−4.30)	

(Raw materials and fuels)

$$l_n\text{〔Import volume of raw materials and fuels〕} = \sum_{i=-1}^{0} c_i \, l_n\text{〔Industrial production〕} + \sum_{i=-5}^{0} d_i \, l_n\text{〔Yen-denominated import price (raw-materials and fuels)〕}$$

$$+ \sum_{i=-1}^{0} e_i \, l_n\text{〔Input per unit output (materials industry)}\ \underset{(-1.64)}{} \text{〕} - 0.24 \, l_n\text{〔Inventory ratio of imported raw materials}-1\text{〕}$$

$$+ \underset{(0.65)}{1.40}$$

c_i		d_i		e_i	
$i=0$	0.43(2.52)	$i=0$	0.00(0.55)	$i=0$	0.83(3.12)
-1	0.43(2.52)	-1	0.00(0.55)	-1	0.83(3.12)
	0.86(2.52)	-2	0.00(0.55)		1.66(3.12)
		-3	0.00(0.55)		
		-4	0.00(0.55)		
		-5	0.00(0.55)		
			0.00(0.55)		

$R^2=0.91$
D.W.=2.12

(Manufactured goods)

$$\ln[\text{Import volume of manufactured goods}] = \sum_{i=-1}^{0} f_i \ln[\text{Industrial production}] + \sum_{i=-3}^{0} g_i \ln[\text{Yen-denominated import price (manufactured goods)/domestic wholesale price (industrial products)}] - 1.11 \quad (-1.93)$$

	f_i		g_i	
$i=0$	1.16(17.95)	$i=0$	−0.22(−7.75)	$R^2=0.94$
-1	1.16(17.95)	-1	−0.32(−7.75)	
	2.32(17.95)	-2	−0.32(−7.75)	D.W.=1.45
		-3	−0.22(−7.75)	
			−1.08(−7.75)	

(Intermediate goods)

$$\ln[\text{Import volume of intermediate goods}] = \underset{(12.74)}{2.60} \ln[\text{Industrial production}] + \sum_{i=-4}^{0} h_i \ln[\text{Yen-denominated import price (intermediate goods)/domestic wholesale price (intermediate goods)}] - 1.61 \quad (-2.06)$$

	h_i	
$i=0$	−0.41(−2.89)	$R^2=0.91$
-1	−0.16(−3.15)	
-2	−0.08(−0.95)	D.W.=1.71
-3	−0.17(−3.50)	
-4	−0.43(−3.34)	
	−1.25(−6.16)	

Sources: Summary Report on Trade of Japan (Japan Customs Association), Wholesale Price Indexes (Bank of Japan), Industrial Statistics Monthly (MITI).

[Note 4]

Imports of Liberalized Goods

(In millions of yen, tons [except lemonade])

Items:	Imports were liberalized in:	Before liberalization (3-year average) (A) Value	(A) Volume	After liberalization 5-year overage (B) Value	(B) Volume	Most recent (1983) (C) Value	(C) Volume	Rate of increase (B)/(A) Value	(B)/(A) Volume	(C)/(A) Value	(C)/(A) Volume
Pork	'71/Oct.	10,097	23,428	67,559	103,825	153,027	166,253	times 6.7	times 4.4	times 15.2	times 7.1
Ham & bacon	'72/Apr.	79	163	1,786	2,293	258	219	22.6	14.1	3.3	1.3
Sausages	'71/June	67	123	746	1,231	622	954	11.1	10.0	9.3	7.8
Grapes	'71/Jan.	1	6	274	1,074	673	1,565	274.0	179.0	673.0	260.8
Grapefruits	'71/June	267	1,764	17,023	150,659	24,822	177,289	63.8	85 4	93.0	100 5
Tomato puree/paste	'72/Apr.	442	4,115	4,810	27,461	8,171	45,118	10.9	6.7	18.5	11.0
Pineapples	'71/June	1,499	26,880	3,277	55,900	9,190	101,987	2.2	2.1	6.1	3.8
Cake mix	'71/Jan.	10	28	35	114	73	424	3.5	4.1	7.3	15.1
Margarine	'70/Sept.	9	72	52	209	270	734	5.8	2.9	30.0	10.2
Lemonade	'71/June	13	kl 97	235	kl 840	1,542	kl 10,304	18.1	8.7	118.9	106.2
Tea	'71/June	3,193	5,128	5,219	7,825	6,318	8,886	1.6	1.5	2.0	1.3
Crackers	'71/Oct.	266	575	1,748	2,755	2,938	4,216	6.6	4.8	11.0	7.3
Chocolate	'71/Oct.	1,026	1,664	3,894	5,263	5,371	4,923	3.8	3.2	5.2	3.0
Total	—	16,969	—	106,658	—	213.275	—	6.3	—	12.6	—
Import value of foodstuffs	—	billion yen 905.6	—	billion yen 2,100.5	—	billion yen 3,539.1	—	2.3	—	3.9	—

Note: The import value of foodstuffs before liberalization is the 1969-'71 average, and the value after liberalization is the 1972-'76 average.

Source: Monthly Report on Trade of Japan (Japan Customs Association).